# Sequatchie caddisfly
## (*Glyphopsyche sequatchie*)

### Description
Like all caddisflies, the Sequatchie caddisfly is an insect that spends most of its life in freshwater, emerging into a flying insect once it reaches adulthood. It's only one to two centimeters long as an adult, slightly shorter as a stream-bound juvenile. As a young caddisfly, it uses sticky silk to glue twigs, sand, and stones into a cylindrical case in which it lives, carrying the case with it as it moves, similar to a snail.

The adult Sequatchie caddisfly is a brownish-yellow winged-insect with large wings dominating its body.

*The Sequatchie caddisfly, credit Kevin Moulton/University of Tennessee*

### Life history
In North America, caddisflies typically live a year, most of which is spent in a stream or lake. They grow through five successively larger larval stages, then form a cocoon and enter a pupal stage, undergoing the transition to adult, much like a caterpillar changes into a butterfly. Once fully developed, the pupa crawls out of the water, leaves it pupal skin, and emerges as a flying adult. The adults lay their eggs in plants hanging over the water, and when it rains, the eggs drop into the water.

While in the stream, the Sequatchie caddisfly eats mainly plants, getting nutrients from the aquatic fungi and bacteria on the decaying plant material, and helping break down plant debris that falls into the stream. Adults have mouthparts adapted to a liquid diet, such as flower nectar.

Caddisflies are eaten by fish and are often either used directly as bait, or serve as models for a number of fishing lures, most importantly trout flies. More importantly, caddisflies are one of the groups of aquatic insects (the others being mayflies and stoneflies) that biologists often look for as an indicator of a clean, healthy stream.

### Habitat
The Sequatchie caddisfly is only found in small streams that flow from springs emerging from caves. It prefers clean, cold water with stream bottom made up of cobble, gravel, and sand with very little to no silt or very fine sediment. They also show a preference for areas where the stream is well shaded by trees, and has downed wood in the water.

### Distribution
The Sequatchie caddisfly is known from three places in the world, all in Marion County, in southeast Tennessee:

- Owen Spring Branch, about 25 miles west of Chattanooga. This is the site where the caddisfly was first discovered in March, 1994. This site is also home to the endangered royal snail (*Pyrgulopsis ogmorhaphe*);
- Martin Spring, a tributary to Battle Creek. This population was discovered in 1998.
- In 2010 a single individual was found at nearby Clear Spring, but the caddisfly has not been seen there since.

In 2013 biologists undertook a search for new populations at 40 sites similar to the three places where the caddisfly was known, covering portions of both Tennessee and Alabama. No new populations were uncovered.

*The Sequatchie caddisfly larvae, credit David Withers TDEC*

While biologists fear it may have disappeared from Clear Spring, a 2014 search found 260 in Martin Spring, more than has ever been found there. That same 2014 search effort found 269 in Owen Spring. Biologists involved in a 2013 search estimated that and Owen Spring has 1,500 – 3,000 individuals.

### Threats
This caddisfly faces threats common to a lot of stream animals, especially water pollution, but these threats are exacerbated by the animal's extremely limited distribution.

- Siltation – dirt in water is a common water quality issue. This can come from stream bank erosion, erosion of upland sites, or erosion within the stream channel itself, for example when off-road vehicle traverse streams.
- *Lack of woody debris in streams*
  Fallen tree trunks or roots of trees near stream edges, branches, and twigs in streams provide important shelter for stream animals and are a source of food for decomposers.
- *Crushing by stream users*
  Though getting walked on is not generally considered a significant threat to other aquatic species, it may be for the Sequatchie caddisfly, given the limited area where it's found.
- *Flooding by beavers*
  The Sequatchie caddisfly prefers cold, clear, swiftly moving streams. A beaver dam would dramatically alter the stream habitat and make it unusable by the caddisfly.
- *Inputs of warm water or pollutants*
  The introduction of chemicals or even unusually warm water can alter a stream in a way that could kill Sequatchie caddisflies or make potential habitat unusable.

- *Predation by non-native species* Predation is completely natural, however the introduction of non-native predators can shift the balance between predator and prey which can be problematic if the prey is extremely rare.

## History of efforts to place on the endangered species list

- Due to its rarity and extremely limited distribution, in 1999 the Service placed the caddisfly on its candidate list. This meant the caddisfly should probably be on the federal endangered species list, but there were higher priority species that had to be addressed first.
- In 2004, the Fish and Wildlife Service was asked by the Center for Biological Diversity to place it on the endangered species list. Due to numerous requests to place plants and animals on the list, the caddisfly wasn't addressed until 2015.
- The Service has included the Sequatchie caddisfly as part of its 2015 workload, and by the end of the year will either determine that the animals does not need to be on the endangered species list, or begin the process for placing it on the list.

## What does it means for an animal to be on the endangered species list?

When an animal is placed on the federal endangered species list, it makes it illegal to kill, shoot, trap, harass, harm, pursue, wound, capture or collect it without a permit from the Fish and Wildlife Service. Typically permits are only given to individuals for actions that ultimately benefit the species.

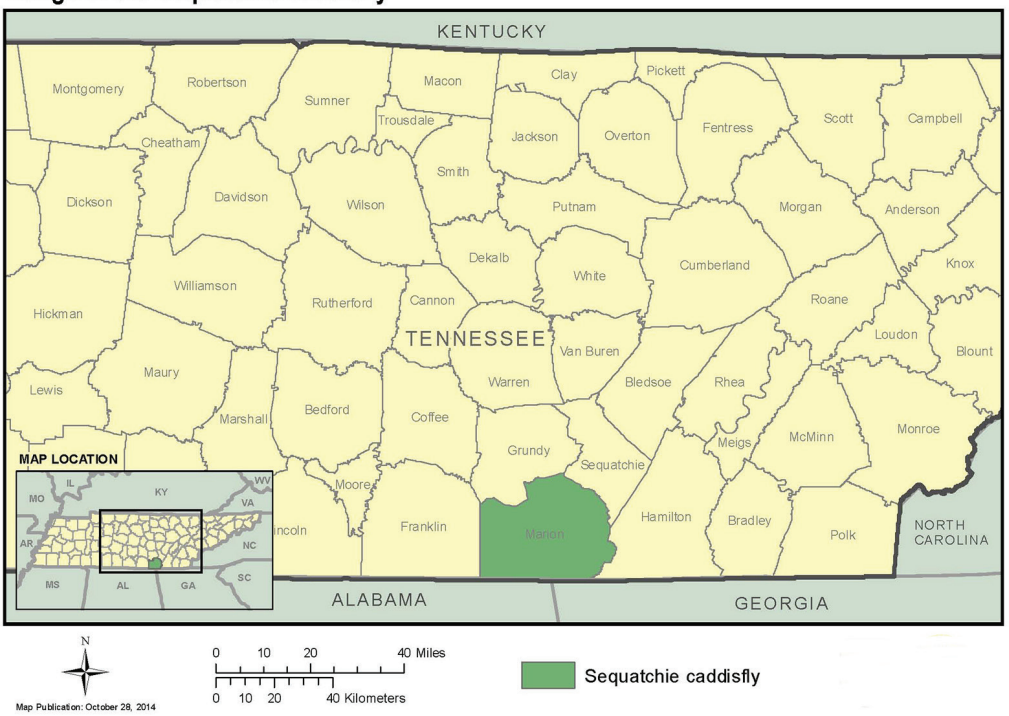
Additionally, projects that are federally-funded or authorized are reviewed for impacts to the animals, as these projects typically can't jeopardize the existence of a species. Efforts are made to minimize, or hopefully eliminate, impacts.

## What can be done

There are straightforward steps that can be taken to improve the outlook for the Sequatchie caddisfly, and in fact can help make any stream healthier:

- Plant native trees and shrubs along stream and allow these areas to grow naturally. The root systems help hold stream bank soil in place and a lush diversity of plants serves as a filter, catching polluted runoff before it can enter the stream.

**Range of the Sequatchie caddisfly**




- Let naturally-fallen woody material remain in streams
- Keep streams free of trash
- Look for ways to move rainwater off paved surfaces and allow it to soak into the ground. When channeled off paved surfaces and into streams, rainwater carries pollution (like oil) picked up while flowing over pavement and erodes stream banks and bottom not shaped to handle the excess water. Helpful techniques include using pervious pavement, rainbarrels, and installing rain gardens – gardens where rainwater is channeled and allowed to soak into the ground.

Because of the Sequatchie caddisfly's extremely limited range, there are additional steps that can be taken to help it:

- Limit scientific or recreational activities at known locations to minimize habitat disturbance, and impacts from collection or crushing.
- Control beavers to ensure habitat does not become flooded
- Limit the use of chemicals near known locations

## References

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